

IN THE CLAIMS:

1. (Currently Amended) A video data transmission/reception system comprising a transmission-side apparatus and a plurality of reception terminals, the transmission-side apparatus transmitting video data that has been compressed using motion compensation interframe prediction, and the reception terminals receiving the video data and decoding the received video data, wherein

the transmission-side apparatus includes:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the first encoding unit applying interframe encoding processing to a plurality of frames of moving image data, to generate only interframe frame data for the video data;

a second encoding unit consisting of a second DCT unit and a second quantization unit, the second encoding unit applying in parallel with the encoding processing by the first encoding unit, intraframe encoding processing to a frame of the moving image data, to generate substitute I frame data for the video data;

an encoded video data generation unit connected to the first encoding unit and the second encoding unit to combine the substitute I frame data and the interframe frame data to form the video data; and

a transmission unit transmitting the video data and the substitute I frame data to the plurality of reception terminals,

wherein when the transmission unit is to resume transmission of the video data to one of the reception terminals after temporarily interrupting transmission of the video data to the reception terminal, the transmission unit checks each of a plurality of frames to determine

whether a reference frame for each of ~~[[a]]~~ the plurality of frames to be transmitted after resuming transmission of the video data has been transmitted or not, and if the reference frame has not been transmitted, transmits the substitute I frame data to the reception terminal for each
25 of the plurality of frames ~~the frame~~ for which the reference frame has not been transmitted before resuming transmission of the video data,

the reception terminal, when the transmission unit is to resume the temporarily interrupted transmission of the video data, receives the transmitted substitute I frame data, decodes the received substitute I frame data, and uses the decoded substitute I frame data as
30 reference frame data to decode video data that is received after resumption of transmission, and

wherein the first encoding unit and the second encoding unit are included in a same encoder which has one motion compensation unit and one predictive memory unit.

2. (Currently Amended) A video data transmission apparatus that transmits video data that has been compressed using motion compensation interframe prediction to a plurality of reception terminals, comprising:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the
5 first encoding unit applying interframe encoding processing to each of a plurality of frames of moving image data, to generate only interframe frame data for the video data;

a second encoding unit consisting of a second DCT unit and a second quantization unit, the second encoding unit applying in parallel with the encoding processing by the first encoding unit, intraframe encoding processing to a frame of the moving image data, to generate
10 substitute I frame data for the video data;

an encoded video data generation unit connected to the first encoding unit and the second encoding unit to combine the substitute I frame data and the interframe frame data to form the video data; and

15 a transmission unit transmitting the video data and the substitute I frame data to the plurality of reception terminals, and when the transmission unit is to resume transmission of the video data to one of the reception terminals after temporarily interrupting transmission of the video data to the reception terminal, the transmission unit checks each of a plurality of frames to determine whether a reference frame for each of ~~[[a]]~~ the plurality of frames to be transmitted after resuming transmission of the video data has been transmitted or not, and if the reference
20 frame has not been transmitted, transmits the substitute I frame data to the reception terminal for each of the plurality of frames ~~the frame~~ for which the reference frame has not been transmitted before resuming transmission of the video data,

wherein the first encoding unit and the second encoding unit are included in a same encoder which has one motion compensation unit and one predictive memory unit.

3. (Previously Presented) The video data transmission apparatus of Claim 2, further comprising:

an option data transmission unit transmitting option video data to the reception terminal, in parallel with the transmission of the video data,

5 wherein the interruption of video data transmission to the reception terminal is caused by the transmission of the option video data.

4. (Previously Presented) The video data transmission apparatus of Claim 3, wherein

the option data transmission unit

includes an information collection sub-unit operable collecting from each of one
5 or more of the reception terminals, information about preferences of a user of the reception
terminal, and

based on the collected information, selects contents of option data to be
transmitted.

5. (Previously Presented) The video data transmission apparatus of Claim 3,
wherein

the transmission unit includes

a broadcast transmission sub-unit broadcasting a same data to a plurality of
5 transmission destinations; and

an individual transmission sub-unit transmitting individual data to an individual
transmission destination,

wherein the broadcast transmission sub-unit transmits the video data, and the
individual transmission sub-unit transmits the substitute I frame data, and

10 the option data transmission unit transmits the option video data in an individual
transmission manner.

6. (Previously Presented) The video data transmission apparatus of Claim 5,
wherein

the transmission unit includes

a switch sub-unit exempting a reception terminal to which substitute I frame data
5 or option video data is being transmitted from being a target of transmission of the video data by
the broadcast transmission sub-unit.

7. (Previously Presented) The video data transmission apparatus of Claim 3,
wherein

the option data transmission unit includes

an insertion sub-unit transmitting secondary option data part way through
5 transmission of the option data; and

a third encoding sub-unit generating option data substitute I frame data that
corresponds to at least one frame of the option data starting from a frame that is a first frame
after transmission resumption, after transmission of the secondary option data ends and before
transmission of the option data resumes,

10 wherein when transmission of the option data is to resume after the transmission
of the secondary option data ends, the option data transmission unit transmits the option data
substitute I frame data to the reception terminal before transmission of the option data resumes.

8. (Cancelled)

9. (Original) The video data transmission apparatus of Claim 2, wherein

the transmission unit determines how many frames of substitute I frame data to
transmit to the reception terminal before resuming transmission of the video data, based on a
GOP structure of the video data, and in particular, based on a frequency of appearance of frames
5 having an I attribute or a P attribute.

10. (Currently Amended) A video data transmission apparatus that transmits video data that has been compressed using motion compensation interframe prediction to a plurality of reception terminals, comprising:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the
5 first encoding unit applying intraframe encoding processing to a frame of moving image data, to generate intraframe encoded video data;

a second encoding unit consisting of a second DCT unit and a second quantization unit, the second encoding unit applying interframe encoding processing to a frame of moving image data, to generate interframe encoded video data;

10 a video data generation unit generating the video data from the intraframe encoded video data and the interframe encoded video data; and

a transmission unit transmitting the video data to the plurality of reception apparatuses,

wherein when the transmission unit is to resume transmission of the video data to
15 one of the reception terminals after temporarily interrupting transmission of the video data to the reception terminal, the transmission unit checks each of a plurality of frames to determine whether a reference frame for each of ~~[[a]]~~ the plurality of frames to be transmitted after resuming transmission of the video data has been transmitted or not, and if the reference frame has not been transmitted, transmits the substitute I frame data to the reception terminal for each
20 of the plurality of frames ~~the frame~~ for which the reference frame has not been transmitted before resuming transmission of the video data, and

wherein the first encoding unit and the second encoding unit are included in a same encoder which has one motion compensation unit and one predictive memory unit.

11. (Currently Amended) A video data transmission/reception system comprising a plurality of video data provision apparatuses, a plurality of reception terminals, and a distribution server, the video data provision apparatuses transmitting video data that has been compressed using motion compensation interframe prediction, each reception terminal receiving the video
5 data from any one of the video data provision apparatuses and decoding the received video data, and the distribution server conveying the video data between the video data provision apparatuses and the reception terminals, wherein

each video data provision apparatus includes:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the
10 first encoding unit applying interframe encoding processing to each of a plurality of frames of moving image data, to generate only interframe frame data for the video data;

a second encoding unit consisting of a second DCT unit and a second quantization unit, the second encoding unit applying in parallel with the encoding processing by the first encoding unit, intraframe encoding processing to each of a plurality of frames of the moving
15 image data, to generate substitute I frame data; and

an encoded video data generation unit connected to the first encoding unit and the second encoding unit to combine the substitute I frame data and the interframe frame data to form the video data,

wherein the first encoding unit and the second encoding unit are included in a
20 same encoder which has one motion compensation unit and one predictive memory unit, and

the distribution server includes:

a switch request reception unit operable to receive a request from one of the reception terminals to switch video data received by the reception terminal to different video data; and

25 a switch transmission unit stopping transmission of the video data being transmitted to the request-originating user terminal, checking each of a plurality of frames to determine whether a reference frame for each of [[a]] the plurality of frames to be transmitted during a start of transmission of the different video data has been transmitted or not, and if the reference frame has not been transmitted, obtaining substitute I frame data, for each of the
30 plurality of frames for which the reference frame has not been transmitted, from a video data provision apparatus that is to provide the different video data and transmitting the obtained substitute I frame data to the user terminal, and transmitting the different video data to the user terminal, when the switch request reception unit receives the request from one of the reception terminals.

12. (Cancelled)

13. (Currently Amended) A video data provision apparatus in a video data transmission/reception system that includes a plurality of video data provision apparatuses, a plurality of reception terminals, and a distribution server, the video data provision apparatuses transmitting video data that has been compressed using motion compensation interframe
5 prediction, each reception terminal receiving video data from any one of the video data provision apparatuses, and the distribution server conveying the video data between the video data

provision apparatuses and the reception terminals, the video data provision apparatus comprising:

10 a first encoding unit consisting of a first DCT unit and a first quantization unit, the first encoding unit applying interframe encoding processing to each of a plurality of frames of moving image data, to generate only interframe frame data for the video data;

15 a second encoding unit consisting of a second DCT unit and a second quantization unit, the second encoding unit applying in parallel with the encoding processing by the first encoding unit, intraframe encoding processing to each of a plurality of frames of the moving image data, to generate substitute I frame data;

an encoded video data generation unit connected to the first encoding unit and the second encoding unit to combine the substitute I frame data and the interframe frame data to form the video data; and

20 a transmission unit transmitting the video data to the distribution server, and, when one of the reception terminals requests to switch video data being received to the video data being transmitted by the transmission unit, the transmission unit checks each of a plurality of frames to determine whether a reference frame for each of [[a]] the plurality of frames to be transmitted after the switch has been transmitted or not, and if the reference frame has not been transmitted, transmits the substitute I frame data for each of the plurality of frames for which the
25 reference frame has not been transmitted to the reception terminal via the distribution server, before the switch, and

wherein the first encoding unit and the second encoding unit are included in a same encoder which has one motion compensation unit and one predictive memory unit.

14. - 15. (Cancelled)

16. (Currently Amended) A video data transmission/reception method used by a transmission-side apparatus and one of a plurality of reception terminals in a video data transmission/reception system in which the transmission-side apparatus that transmits video data that has been compressed using motion compensation interframe prediction, and the plurality of
5 reception terminals receive the video data and decode the received video data, the method comprising:

a first encoding step, in the transmission-side apparatus, of applying interframe encoding processing to a plurality of frames of moving image data, to generate only interframe frame data for the video data;

10 a second encoding step, in the transmission-side apparatus, of applying, in parallel with the first encoding step, intraframe encoding processing to each of a plurality of frames of the moving image data, to generate substitute I frame data;

a combining step of combining I frame data and interframe frame data to generate the video data;

15 a video data transmission step, in the transmission-side apparatus, of transmitting the video data to the one of the plurality of reception terminals;

a transmission interruption step, in the transmission-side apparatus, of interrupting transmission of the video data to the one of the plurality of reception terminals;

a reference frame checking step, in the transmission-side apparatus, of checking
20 each of a plurality of frames to determine whether a reference frame for each of [[a]] the

plurality of frames to be transmitted after resuming transmission of the video data to the one of the plurality of reception terminals has been transmitted or not;

a substitute data transmission step, in the transmission-side apparatus, of transmitting the substitute I frame data to the one of the plurality of reception terminals for each
25 of the plurality of frames ~~the frame~~ for which the reference frame has not been transmitted, before resuming transmission of the video data to the one of the plurality of reception terminals;

a substitute data decoding step, in the reception terminal, of decoding the substitute I frame data;

a video data retransmission step, in the transmission side apparatus, of resuming
30 transmission of the video data to the one of the plurality of reception terminals; and

a video data decoding step, in the reception terminal, of decoding the video data received after resumption of transmission, using data obtained as a result of executing the substitute data decoding step, as reference frame data,

wherein the first encoding step and the second encoding step are executed in a
35 single encoder, the single encoder containing one motion compensation unit, one predictive memory unit, and two encoding units, each of the two encoding units consisting of a DCT unit and a quantization unit.

17. (Currently Amended) A computer readable medium embodying a executable in a computer, the program causing the computer to perform a video data transmission method used by a transmission-side apparatus in a video data transmission/reception system in which the transmission-side apparatus that transmits video data that has been compressed using motion

5 compensation interframe prediction, and a plurality of reception terminals receive the video data and decode the received video data, the method comprising:

a first encoding step of applying interframe encoding processing to a plurality of frames of moving image data, to generate the video data;

10 a second encoding step of applying, in parallel with the first encoding step, intraframe encoding processing to each of a plurality of frames of the moving image data, to generate substitute I frame data;

a combining step of combining I frame data and interframe frame data to generate the video data;

15 a video data transmission step of transmitting the video data to one of the plurality of reception terminals;

a transmission interruption step of interrupting transmission of the video data to the one of the plurality of reception terminals;

20 a reference frame checking step of checking each of a plurality of frames to determine whether a reference frame for each of [[a]] the plurality frames to be transmitted after resuming transmission of the video data to the one of the plurality of reception terminals has been transmitted or not;

25 a substitute data transmission step of transmitting the substitute I frame data to the one of the plurality of reception terminals for each of the plurality of frames ~~the frame~~ for which the reference frame has not been transmitted, before resuming transmission of the video data to the one of the plurality of reception terminals; and

a video data retransmission step of resuming transmission of the video data to the one of the plurality of reception terminals,

wherein the first encoding step and the second encoding step are executed in a single encoder, the single encoder containing one motion compensation unit, one predictive
30 memory unit, and two encoding units, each of the two encoding units consisting of a DCT unit and a quantization unit.

18. (Previously Presented) The video data transmission apparatus of Claim 1 further comprising a substitute I frame buffer connected to the second encoding unit and the transmission unit to store substitute I frame data.

19. (Previously Presented) The video data transmission apparatus of Claim 2 further comprising means for storing substitute I frame data from the second encoding unit for transmission to the transmission unit.

20. (Previously Presented) The video data transmission apparatus of Claim 1 wherein the interframe data comprise P frame data and B frame data.

21. (Previously Presented) The video data transmission apparatus of Claim 1 wherein the transmission-side apparatus further includes a frame judgment unit analyzing the interframe
5 frame data to obtain frame serial numbers.

22. (Previously Presented) The video data transmission apparatus of Claim 21 wherein the transmission unit uses the frame serial numbers to determine whether a reference frame of a frame to be transmitted after resuming transmission of the video data has been transmitted or not.